

Maps and photos

- Map 1. Overall monitoring region and transect layout.
- Map 2. Battery Cavallo transects.
- Map 3. Battery Duncan transects.
- Map 4. Wolfback Ridge transects.
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Map 1. Overall monitoring region and transect layout.



Map 2. Battery Cavallo transects.



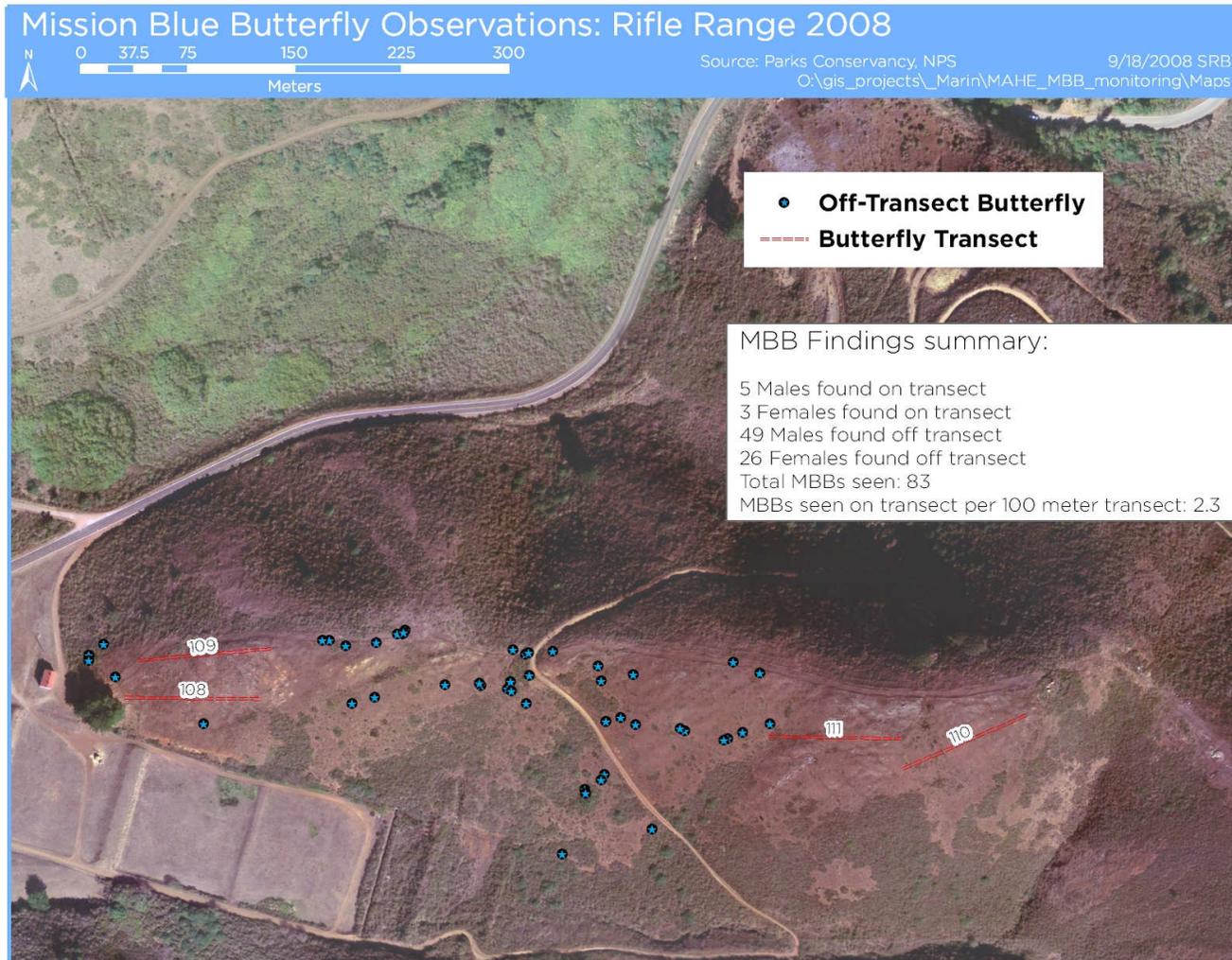
Map 3. Battery Duncan transects.



Map 4. Wolfback Ridge transects.



Map 5. Rifle Range transects.



Map 6. Slacker Ridge transects.



Map 7. Monitoring outside transect areas.

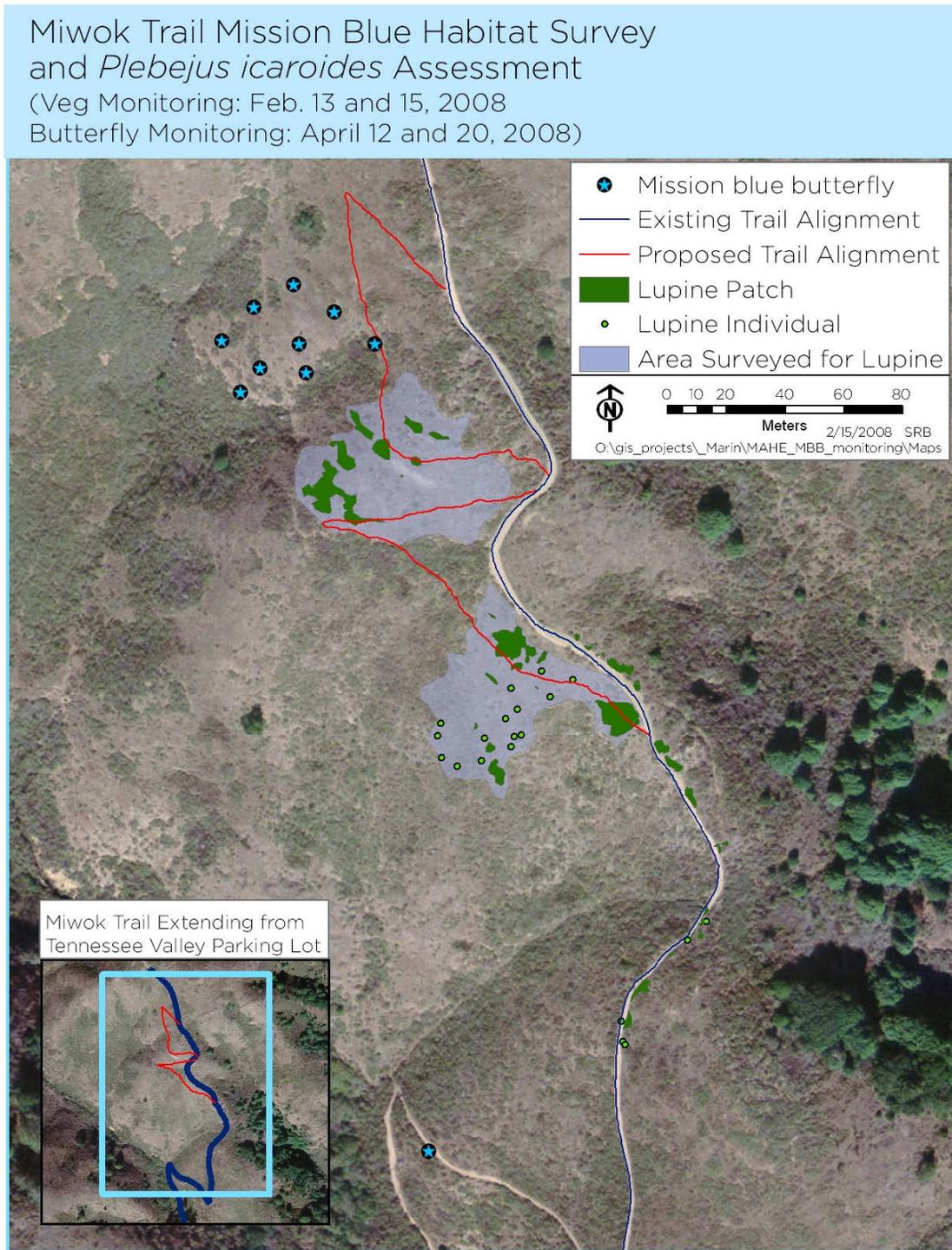


Photo 1. Female Mission blue butterfly seen at Wolfback Ridge on French broom, 5/7/2008.



Photoset 2. Mission blue males observed along Miwok Trail. Note the thin black border between the blue coloration and the white edges.



Photo 3. Mission blue female along Miwok Trail, in between depositing eggs on *Lupinus albifrons*. Notice obvious blue coloration and choice of host plant.



Tables

Table 1. Weather conditions during monitoring surveys.

Table 2a. Mission blue abundance on transects.

Table 2b. Mission blue abundance off transect.

Table 3. Comparisons of Mission blue butterfly phenology and abundance patterns in the Marin Headlands over twelve years, 1994-2007.

Table 1. Weather conditions during monitoring surveys.

	Survey #	Date	Cavallo	Duncan	Wolfback	Rifle	Slacker	Mean	SD
Temp F	1	2/25/2008	55.15	56.85	56.175	55.45	57.4	56.425	1.378858
	2	3/5/2008	58.05	56.95	62.275	64.175	64.94	64.5575	2.811176
	3	3/11/2008	55.35	62.45	63.525	57.125	57.28	57.2025	3.988133
	4	3/17/2008	59.35	57.15	58.3	59.675	64.94	62.3075	1.141522
	5	3/24-3/26	55	55	58.3	54.675	56.12	55.3975	1.711104
	6	4/3/2008	63.4	55.25	55.65	55.45	57.88	56.665	3.978353
	7	4/11/2008	79.6	79	73.45	71.175	80.78	75.9775	4.224438
	8	4/19-4/20	61.65	55.55	56.975	58.075	55.84	56.9575	2.465625
	9	4/27/2008	66.25	73.65	74.775	68.55	64.78	66.665	4.069724
	10	5/7/2008	60.85	61.75	65.275	58.575	59.12	58.8475	2.783321
	11	5/16-5/17	86.3	86.8	83.3	61.525	66.16	63.8425	12.0702
	12	5/23/2008	59.7	59.9	58.225	57.375	N/A	57.375	1.208477
	13	6/6-6/7	71.15	70.25	69	65.4	60.76	63.08	2.525536
Wind mph	1	2/25/2008	3.15	7	0.75	3.125	4.86	3.9925	1.22683
	2	3/5/2008	2.1	5.75	3.5	2.825	2.66	2.7425	1.841422
	3	3/11/2008	4.6	4	1.825	0.675	2.66	1.6675	1.838818
	4	3/17/2008	4.65	6.75	4.625	4.05	0.94	2.495	1.186974
	5	3/24-3/26	3.35	33.9	2.625	3.75	4.12	3.935	15.33624
	6	4/3/2008	2.15	5.7	2.075	4.125	5.66	4.8925	1.740031
	7	4/11/2008	0.55	1.85	3.825	2	2.34	2.17	1.17339
	8	4/19-4/20	1.4	3.6	3.3	6.45	5	5.725	1.897367
	9	4/27/2008	2.35	3.5	2.325	2.025	1	1.5125	0.65032
	10	5/7/2008	2.9	2.25	4.6	4.85	4.12	4.485	1.273447
	11	5/16-5/17	2.7	4.25	4.825	3.2	6.06	4.63	0.967896
	12	5/23/2008	5.1	7.75	3.525	4.025	N/A	4.025	1.884918
	13	6/6-6/7	1.4	3.15	5.45	2.075	2.8	2.4375	1.773811

Table 2a. Mission blue abundance on transects.

TRANSECT #	2/25/2008			3/5/2008			3/11/2008			3/17/2008			3/24-3/36		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Battery Cavallo															
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Battery Duncan															
102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wolfback Ridge															
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rifle Range															
108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slacker Ridge															
112	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Weekly Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1

Table 2a (cont.).

TRANSECT #	4/3/2008			4/11/2008			4/19-4/20			4/27/2008		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Battery Cavallo												
100	0	0	0	4	1	5	1	1	2	2	0	2
101	0	0	0	1	0	1	3	0	3	0	0	0
Battery Duncan												
102	0	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0	0
Wolfback Ridge												
104	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0	0	0
Rifle Range												
108	0	1	1	0	0	0	1	0	1	0	0	0
109	0	0	0	1	2	3	0	0	0	1	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0
111	0	0	0	1	0	1	0	0	0	0	0	0
Slacker Ridge												
112	3	0	3	3	1	4	1	0	1	0	0	0
113	0	0	0	2	0	2	0	1	1	0	0	0
114	0	0	0	1	1	2	0	0	0	0	0	0
115	1	0	1	2	0	2	0	0	0	0	0	0
116	0	0	0	1	1	2	0	0	0	0	0	0
	Male	Female	Total									
Weekly Total	4	1	5	16	6	22	6	2	8	3	0	3

Table 2a (cont.).

TRANSECT #	5/7/2008			5/16-5/17			5/23/2008			6/6-6/7			Total per Transect
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	
Battery Cavallo													
100	0	0	0	0	0	0	0	0	0	0	0	0	9
101	0	0	0	0	0	0	0	0	0	0	0	0	4
Battery Duncan													
102	0	0	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0	0	0
Wolfback Ridge													
104	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0	0	0	0
Rifle Range													
108	0	0	0	0	0	0	0	0	0	0	0	0	1
109	0	0	0	0	0	0	0	0	0	0	0	0	4
110	0	0	0	0	1	1	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0	0	0	0	0	0	1
Slacker Ridge													
112	0	0	0	0	0	0	0	0	0	0	0	0	9
113	0	0	0	0	0	0	0	0	0	0	0	0	3
114	0	0	0	0	0	0	0	0	0	0	0	0	2
115	0	0	0	0	0	0	0	0	0	0	0	0	4
116	0	0	0	0	0	0	0	0	0	0	0	0	2
Weekly Total	0	0	0	0	1	1	0	0	0	0	0	0	40

Table 2b. Mission blue abundance off transect per week. (Only weeks with butterflies displayed, with 1 week buffer.)

	3/17/2008			3/24/2008			4/3/2008			4/11/2008		
SITE	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Battery Cavallo	0	0	0	0	0	0	0	0	0	3	0	3
Battery Duncan	0	0	0	0	0	0	0	0	0	0	0	0
Wolfback Ridge	0	0	0	0	0	0	0	0	0	0	0	0
Rifle Range	0	0	0	3	0	3	14	8	22	28	16	44
Slacker Ridge	0	0	0	0	0	0	0	0	0	11	4	15
Weekly Total	0	0	0	3	0	3	14	8	22	42	20	62

	4/19-4/20			4/27/2008			5/7/2008			5/16-5/17		
SITE	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Battery Cavallo	1	2	3	1	2	3	0	2	2	0	0	0
Battery Duncan	0	0	0	0	0	0	0	0	0	0	0	0
Wolfback Ridge	0	0	0	0	0	0	0	1	1	0	0	0
Rifle Range	0	0	0	2	2	4	0	0	0	2	0	2
Slacker Ridge	4	1	5	0	0	0	0	0	0	0	0	0
Weekly Total	5	3	8	3	4	7	0	3	3	2	0	2

	5/23/2008			6/6-6/7			Total per Site		
SITE	Male	Female	Total	Male	Female	Total	Male	Female	Total
Battery Cavallo	0	0	0	0	0	0	5	6	11
Battery Duncan	0	0	0	0	0	0	0	0	0
Wolfback Ridge	0	0	0	0	0	0	0	1	0
Rifle Range	0	0	0	0	0	0	49	26	75
Slacker Ridge	0	0	0	0	0	0	15	5	20
Weekly Total	0	0	0	0	0	0	69	38	107

Table 3. Comparisons of Mission blue butterfly phenology and abundance patterns in the Marin Headlands over twelve years, 1994-2007. For data representing between 1994 and 2007, yearly seasonal precipitation and average temperature for January-May (National Weather Service) are given for San Francisco. 2008 weather data was collected on-site at Fort Baker's new permanent weather station. Note that 2007 and 2008 data are represented both by total butterflies observed and butterflies observed only on transects.

Year	Dates of flight season	Duration of flight season	Total # butterflies	Date of peak abundance	# of butterflies at peak	Average Rainfall (July 1- June 30)	Average temperature (Jan. 1- May 30) (°F)
1994	March 17 - May 11	56 days	68	April 10	26	12.34"	56.15
1995	March 26 - April 20	26 days	116	April 9	41	27.16"	56.28
1996	March 16 - May 11	57 days	187	April 5	52	22.01"	58.59
1997	March 8 - May 4	58 days	102	March 29	33	20.19"	57.53
1998	March 29 - May 15	48 days	43	April 26	11	41.20"	54.79
1999	April 4 - May 21	48 days	25	April 17	15	18.58"	52.35
2000	April 9 - April 29	21 days	28	April 25	11	22.09"	55.34
2001	March 25 - May 5	42 days	20	April 14	8	15.18"	54.66
2002	March 20 - May 11	53 days	29	April 11	9	21.32"	53.97
2003	March 21 - May 11	52 days	52	March 29	23	20.71"	55.79
2004	March 20 - May 8	50 days	40	April 2	19	20.48"	56.45
2005	March 15 - May 12	59 days	67	April 5	15	31.89"	55.77
2006	N/A					34.09"	54.08
2007 (on and off transect)	April 7- May 13	39 days	60	April 24	21	15.07"	55.00
2007 (on-transect only)	April 7- May 4	27 days	14	April 16	6	15.07"	55.00
2008 (on and off transect)	March 26- May 16	52 days	147	April 11	84	11.17"	51.98
2008 (on transect only)	March 26- May 16	52 days	40	April 11	22	11.17"	51.98

Figures

Figure 1. Mission Blue abundance in the Marin Headlands.

Figure 2. Abundance of male and female Mission blue butterflies in the Marin Headlands, 2008.

Figure 3. Total Mission blue butterfly abundance at each of the monitoring regions, 2008.

Figure 4. Mission blue abundance per area, controlled for transect area surveyed.

Figure 5a. Seasonal trends in Mission Blue abundance in the Marin Headlands, 1994-2008.

Figure 5b. Seasonal trends in Mission Blue abundance in the Marin Headlands, 1994-2008, includes 2008 off-transect butterflies.

Figure 6a. Annual Variation in Total Mission Blue abundance in the Marin Headlands, 1994-2008. (Only on-transect butterflies represented.)

Figure 6b. Annual Variation in Total Mission Blue abundance in the Marin Headlands, 1994-2008. (2008 data includes off-transect butterflies.)

Figure 7. Relative contribution by each transect to Mission Blue butterfly abundance on the Marin Headlands, 1994-2007 versus 2008.

Figure 1. Mission blue butterfly abundance in the Marin Headlands, 2008.

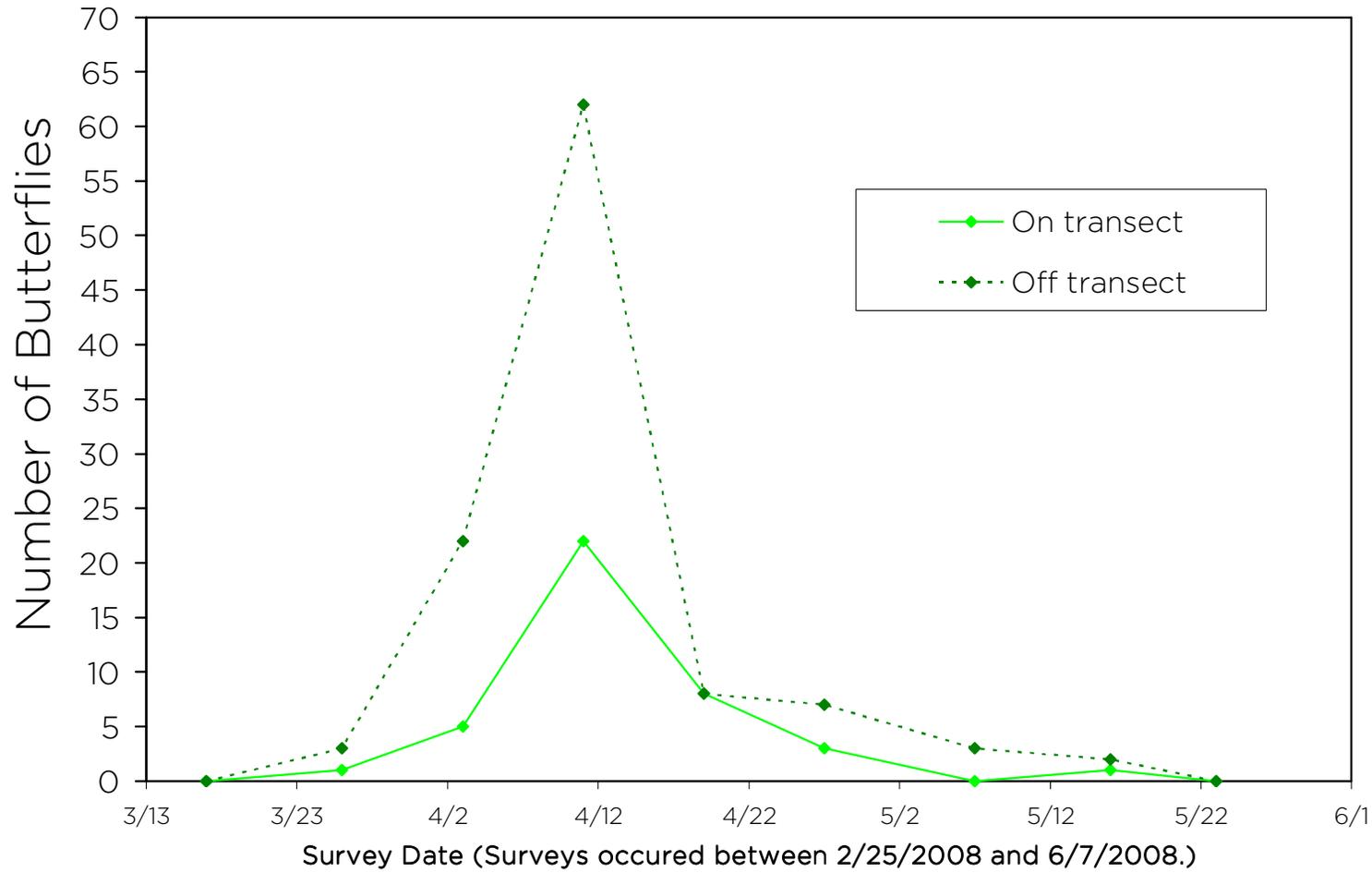


Figure 2. Abundance of male and female Mission blue butterflies in the Marin Headlands, 2008.

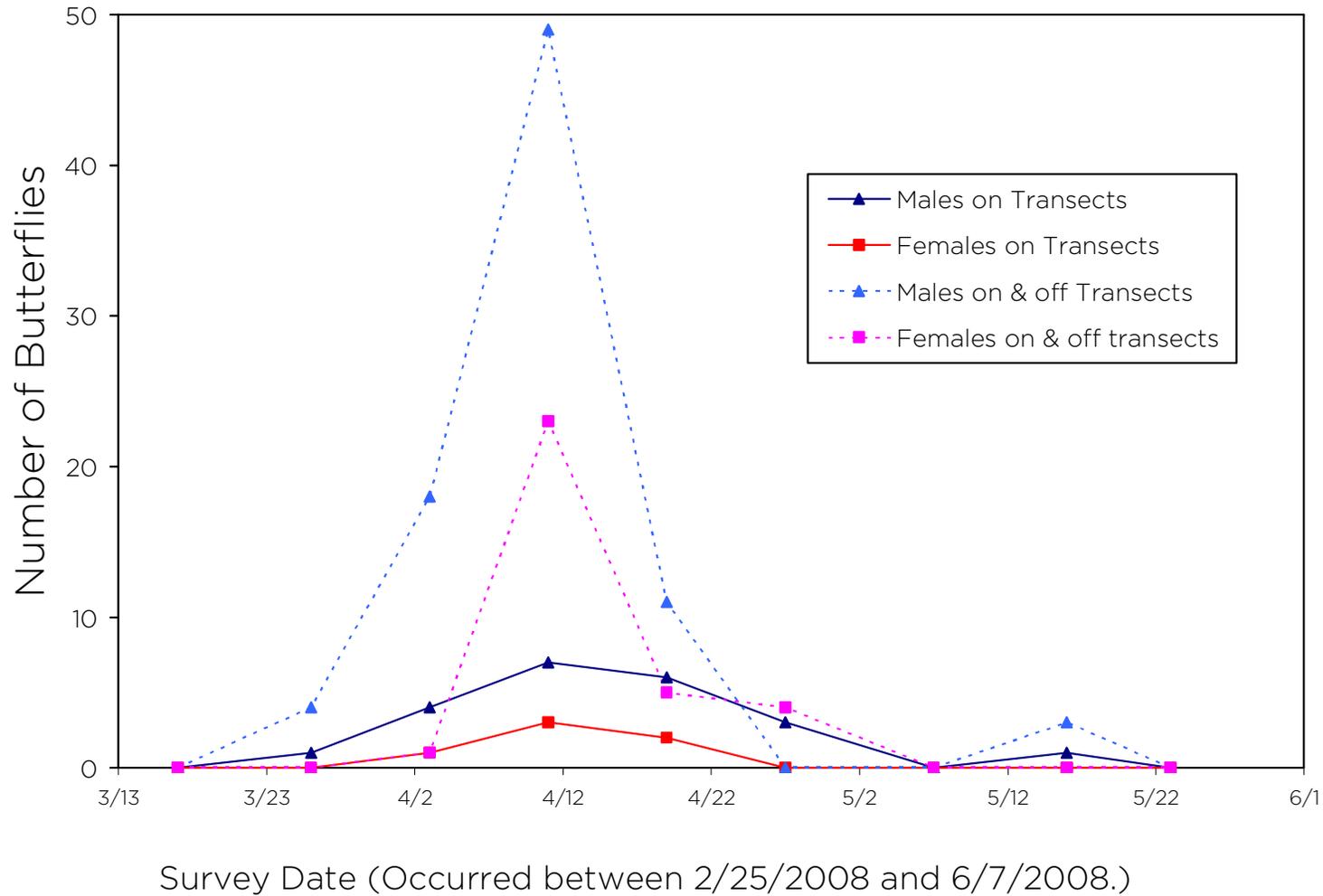


Figure 3. Total Mission blue butterfly abundance at each of the monitoring regions, 2008.

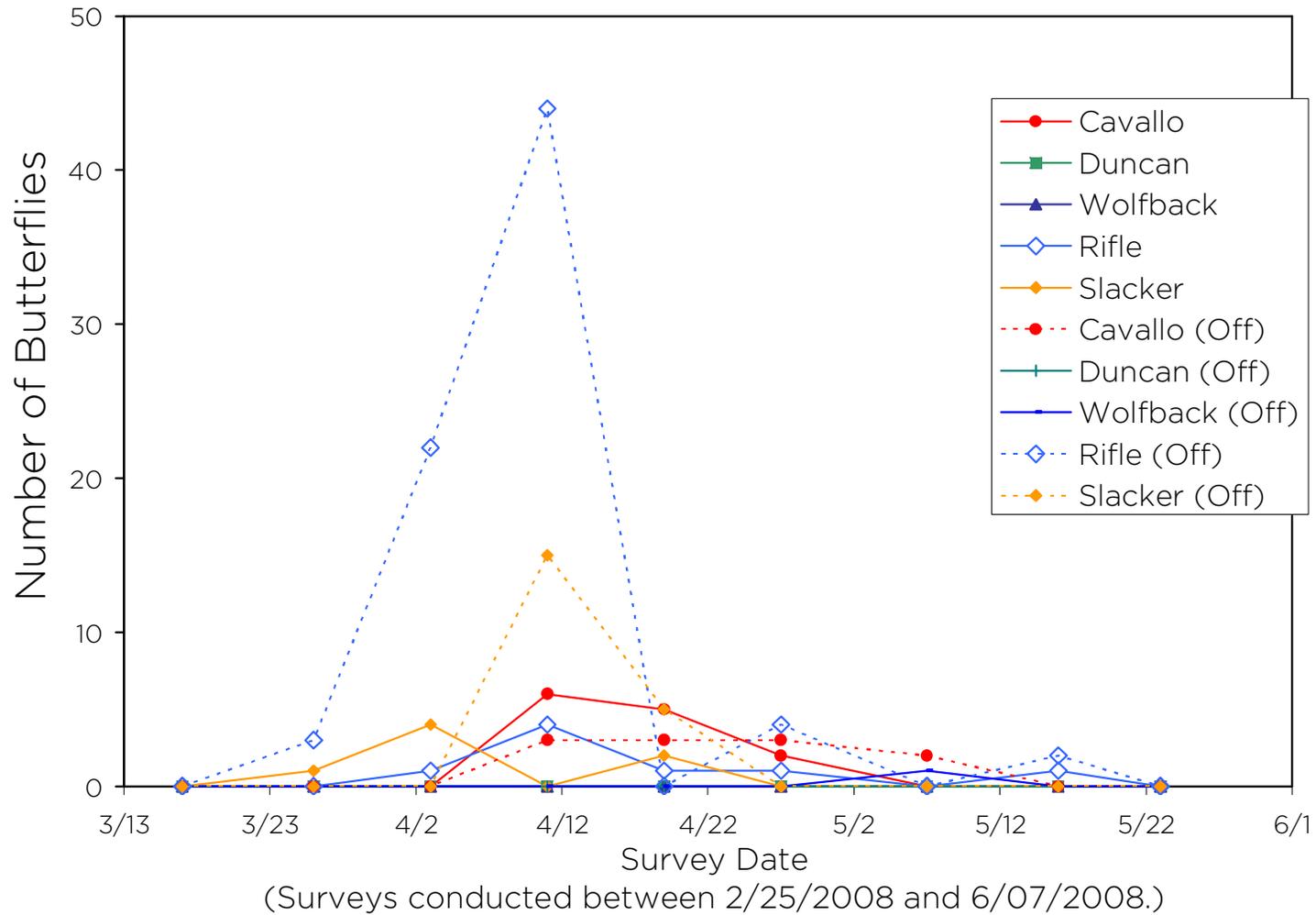


Figure 4. Mission blue butterfly abundance per monitoring region, controlled for transect length, 2008.

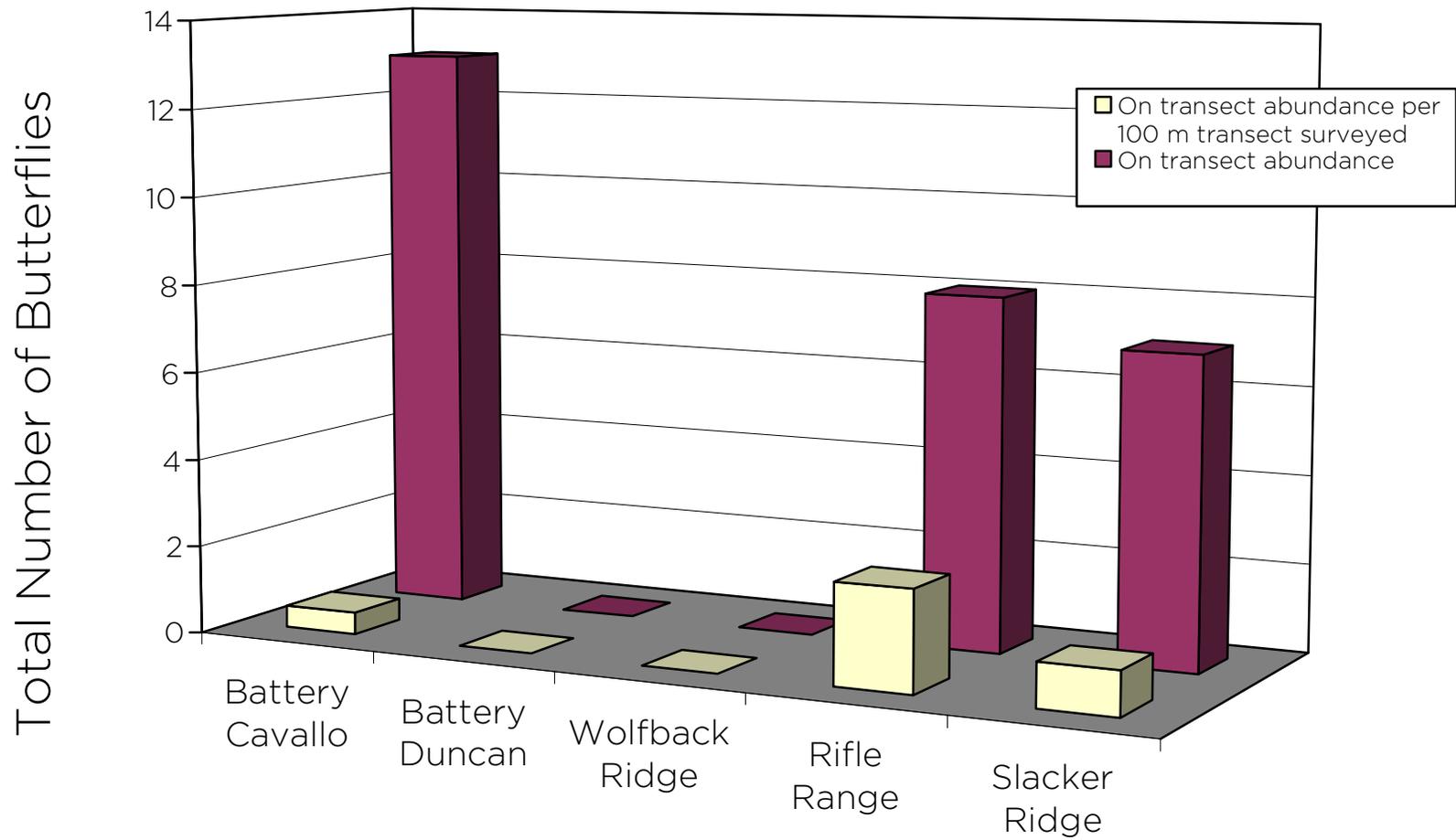


Figure 5a. Seasonal trends in Mission blue butterfly abundance in the Marin Headlands, 1994-2008. (2007 and 2008 data shows on-transect butterflies only.)

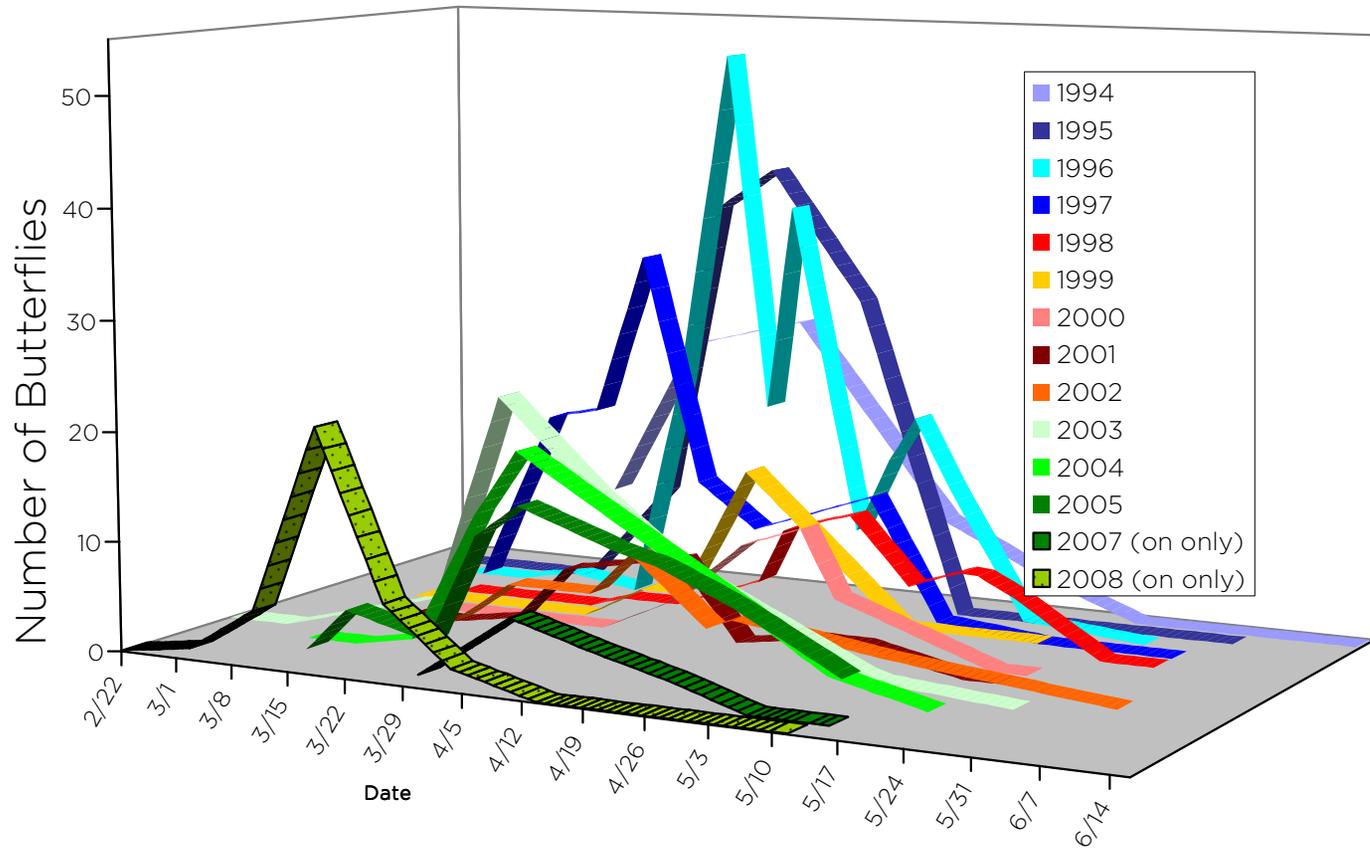


Figure 5b. Seasonal trends in Mission blue butterfly abundance in the Marin Headlands, 1994-2008. (Data from 2007 and 2008 shown in both total butterflies on on-transect only butterflies.)

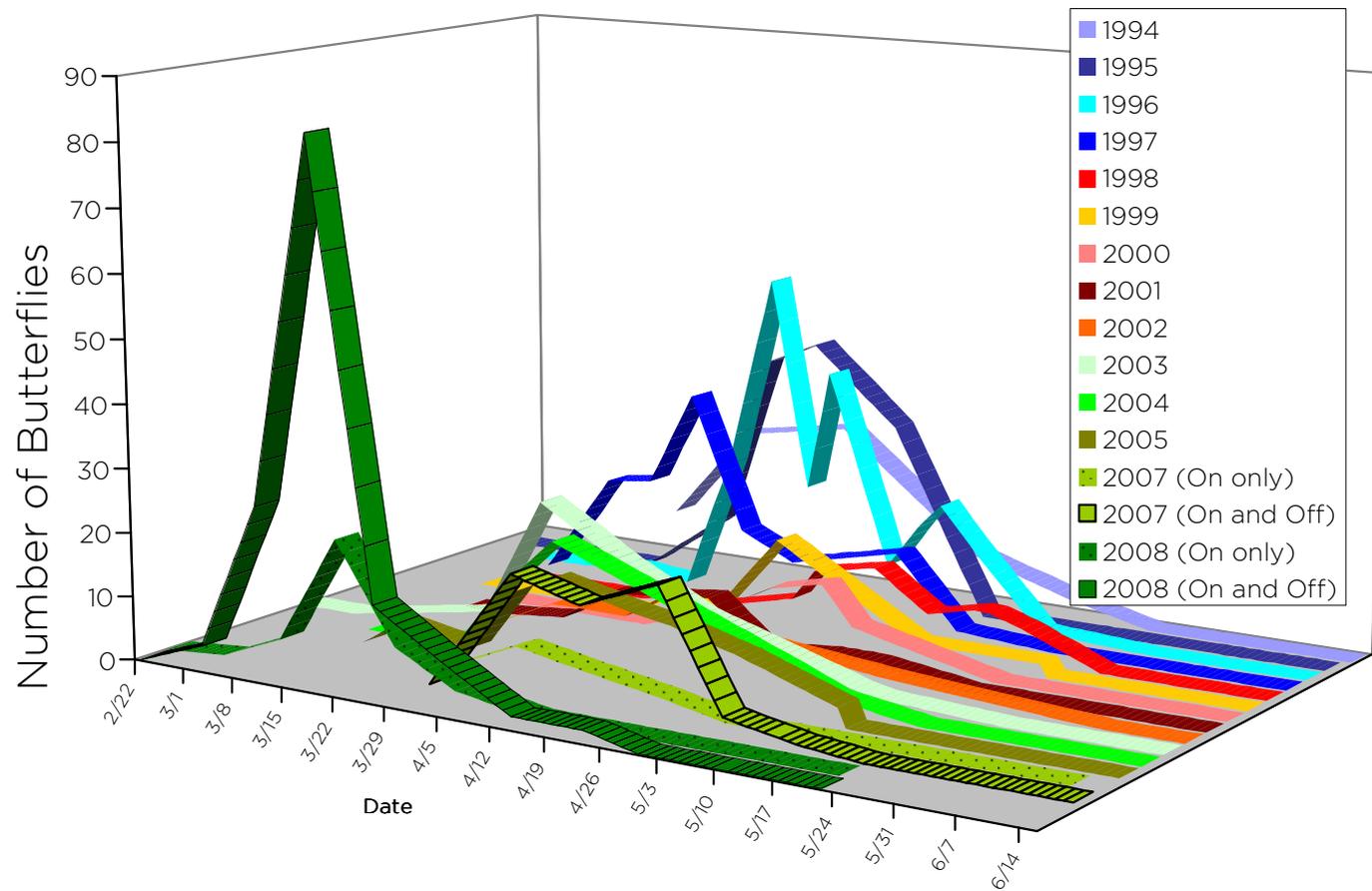


Figure 6a. Annual variation in total Mission blue butterfly abundance in the Marin Headlands, 1994-2008. (Only on-transect butterflies represented.)

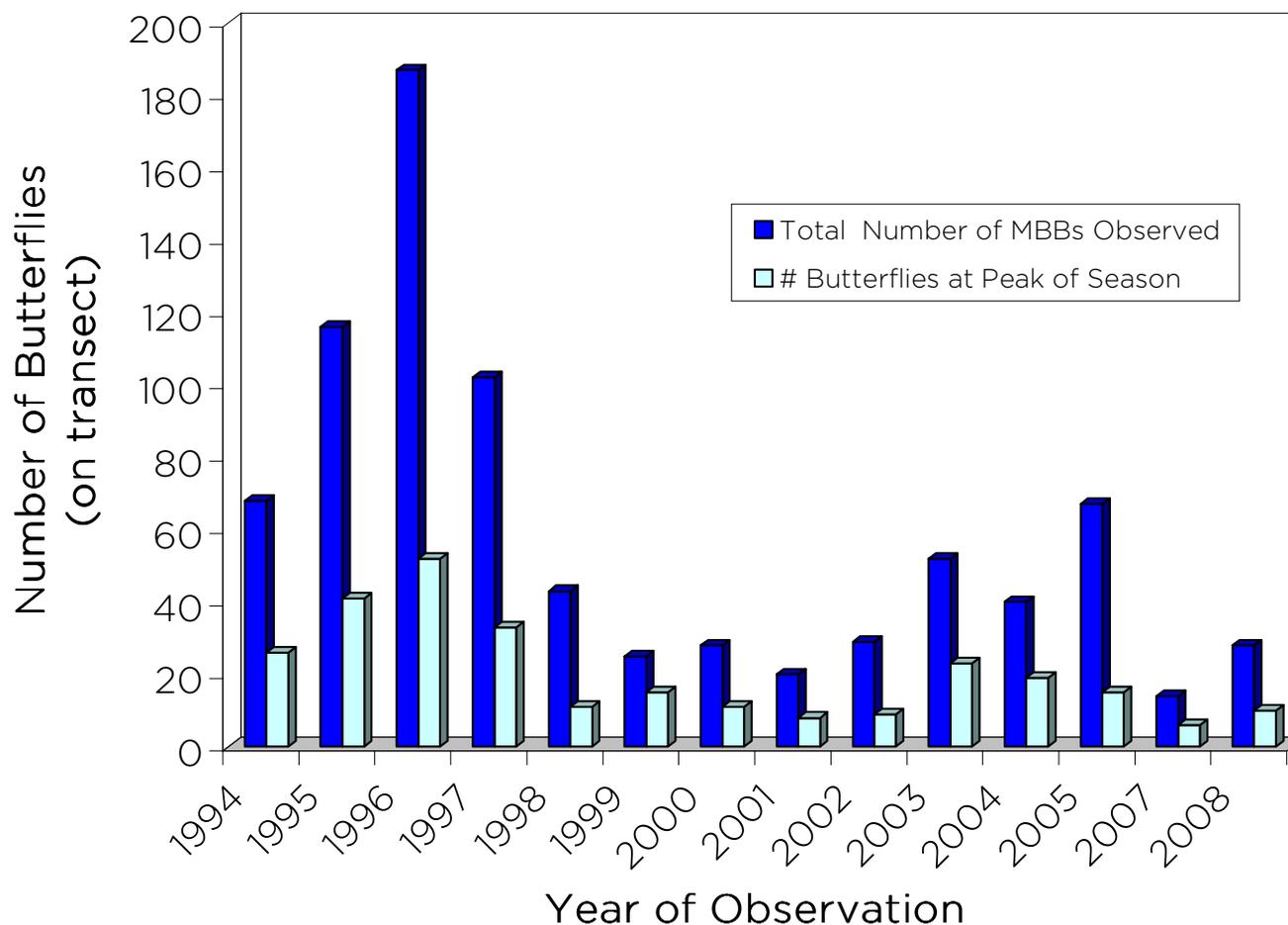


Figure 6b. Annual variation in total Mission blue butterfly abundance in the Marin Headlands, 1994-2008. (2007 and 2008 data includes off-transect butterflies.)

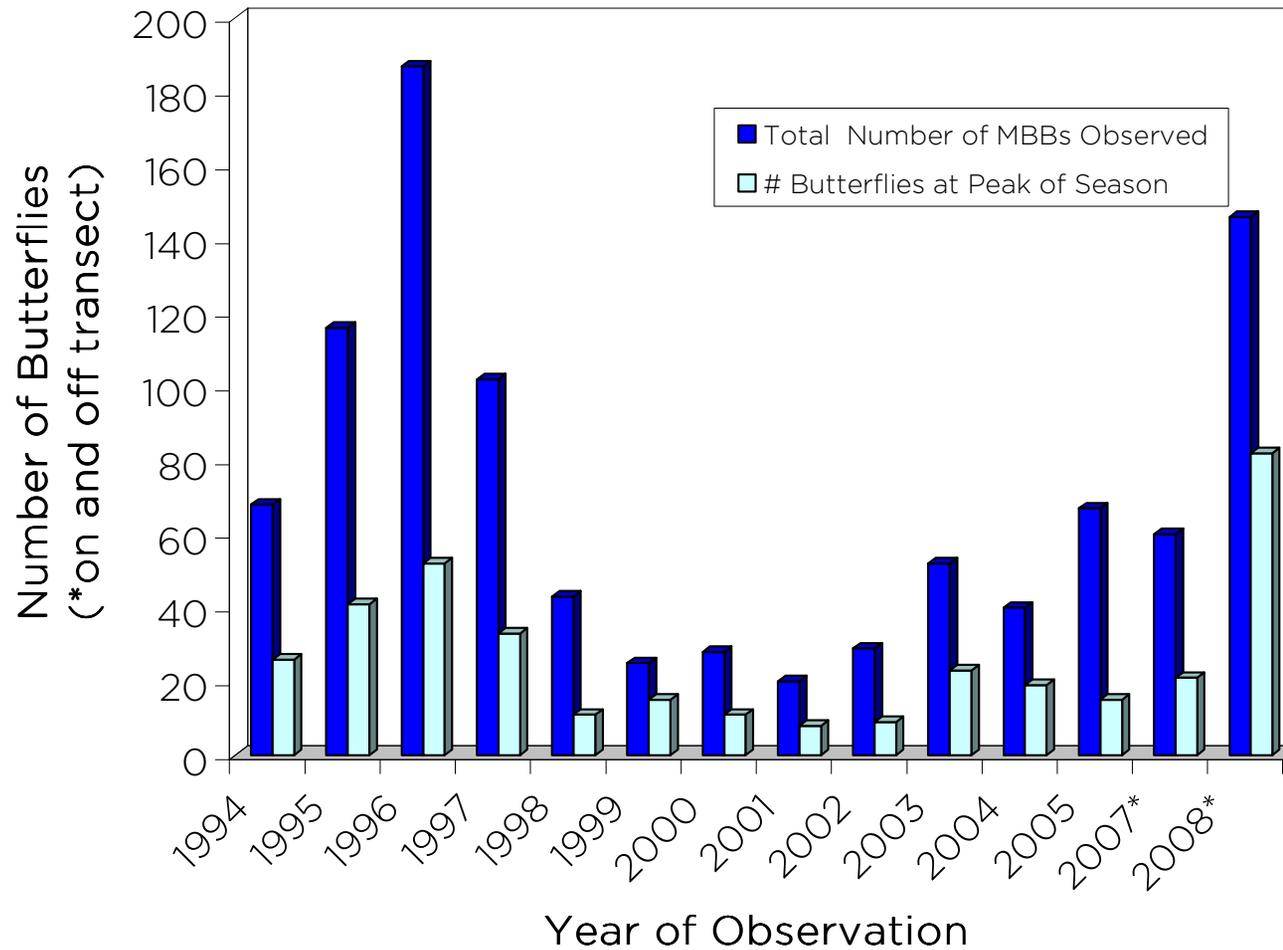
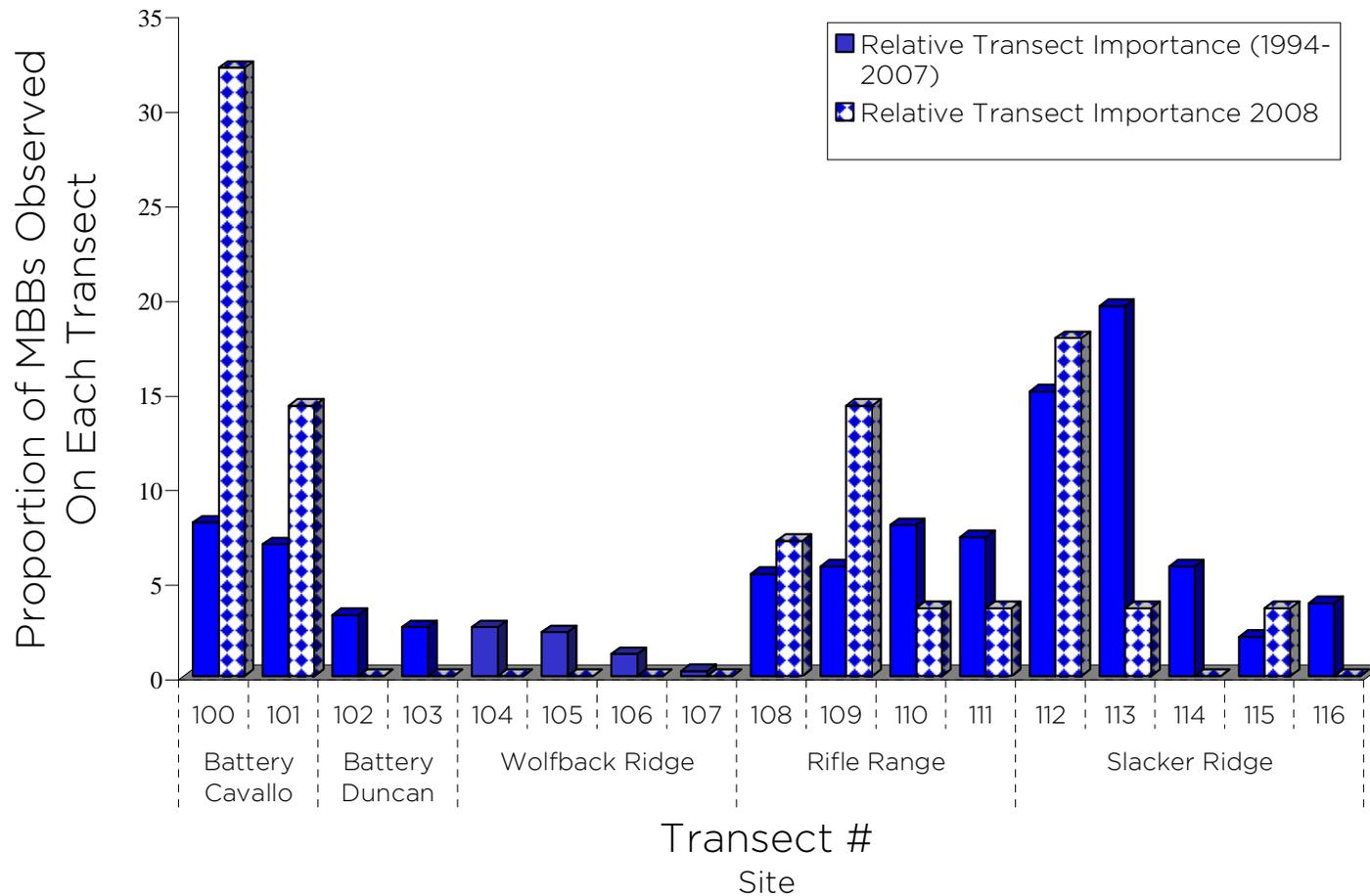


Figure 7. Relative contribution of each transect to Mission blue butterfly abundance in the Marin Headlands, 1994-2007 versus 2008. (Only on-transect observations included in calculations.)



Appendices.

Description of Monitoring Regions and Transects

Transect Monitoring Datasheet

Richmond Rainfall from the Western Regional Climate Center/Fort Baker,
San Francisco air temperatures (°F) from the Western Regional Climate Center/Fort
Baker

E-mail Confirming Identification of Mission blue butterflies along the Miwok Trail

Description of Monitoring Regions and Transects:

- Battery Cavallo consists of two 50 meter transects (T100, T101) in a small meadow closed off to the public by a locked chain link fence (Map 2).
- Battery Duncan consists of two 100 meter transects (T102, T103) on a low-lying ridgetop. This area is closed off to the public by post and cable fences and signage. This area experienced a naturally-occurring burn in recent years (Map 3).
- Wolfback Ridge consists of four 100 meter transects (T104-107) on a steep, south-facing slope. No apparent social trails are near these transects (Map 4).
- Rifle Range consists of four 100 meter transects (T108-111) on a steep, southwest-facing slope. The area surrounding T108 and T109 appear to be visited by park users based on casual social trail observations. The upper two transects appear to have limited human exposure (Map 5).
- Slacker Ridge consists of five 100 meter transects (T112-116). This site covers the greatest diversity of habitats, from grassland hills (T112, T113) to an exposed ridgetop (T114), a gravely spur near where invasive trees were recently removed (T115), and a grassy slope where Monterey pines have been removed and there has been LUAL outplanting (T116) (Map 6).

Transect Monitoring Datasheet

Marin Headlands Mission Blue Butterfly Monitoring Form

Entered into Db

Date: _____ Observers: _____ Validated?

Location: **Battery Cavallo** **Battery Duncan** **Wolfback Ridge** **Rifle Range** **Slacker Ridge** **Fort Baker**

Transect #										
Time Start										
% Cloud Cover										
Prec./Fog Start										
Prec./Fog End										
Wind Direction										
Wind km/hr Start										
Wind km/hr End										
Temp. °C Start										
Temp. °C End										
Rcl. Humidity										
General Cond.										
	male	female								
Flying										
Mating										
Courting										
Male-Male Int.										
Rest on Ground										
Rest on Veget.										
	male	female								
Subtotal										
Total (M+F)										

Total # of MB butterflies observed on transects: _____

of other MB males observed in area: _____

of other MB females observed in area: _____

Other species observed: _____

Comments: _____

1993-2007 data from Richmond Rainfall from the Western Regional Climate Center, <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7414>. 2008 data from National Park Service Fort Baker Weather Station.

Year	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Season total
1993/4	0.00	0.00	0.00	0.30	2.22	2.09	2.01	3.37	0.15	0.91	1.24	0.05	12.34"
1994/5	0.00	0.00	0.10	0.06	4.74	3.02	9.06	0.74	6.87	1.43	0.61	0.53	27.16"
1995/6	0.00	0.00	0.00	0.05	0.02	6.88	5.58	4.75	1.27	1.80	1.66	0.00	22.01"
1996/7	0.00	0.00	0.02	0.95	3.19	6.72	8.00	0.22	0.30	0.32	0.15	0.32	20.19"
1997/8	0.00	0.75	0.06	0.76	6.69	2.39	9.15	13.90	2.48	1.31	3.68	0.03	41.20"
1998/9	0.00	0.00	0.03	0.70	3.57	0.95	3.67	5.47	1.98	2.09	0.06	0.06	18.58"
1999/0	0.00	0.02	0.04	0.67	1.31	0.38	5.97	8.24	2.00	2.07	1.29	0.10	22.09"
2000/01	0.00	0.00	0.24	2.21	0.69	0.53	3.05	5.70	1.14	1.54	0.00	0.08	15.18"
2001/02	0.00	0.00	0.00	0.30	4.86	9.44	1.81	2.03	1.90	0.33	0.65	0.00	21.32"
2002/03	0.00	0.00	0.00	0.00	1.96	10.33	1.58	2.19	1.34	2.50	0.81	0.00	20.71"
2003/04	0.00	0.06	0.00	0.04	2.22	7.69	3.40	5.67	1.16	0.12	0.12	0.00	20.48"
2004/05	0.00	0.05	0.04	2.62	2.07	7.98	4.82	5.19	4.67	2.19	1.32	0.94	31.89"
2005/06	0.00	0.00	0.02	0.93	0.27	8.33	4.14	1.69	9.97	8.56	0.28	0.00	34.19"
2006/07	0.00	0.00	0.00	0.40	2.56	4.01	0.53	5.08	0.41	1.57	0.51	0.00	15.07"
2007/08	0.13	0.01	0.12	0.02	1.05	2.61	5.43	1.44	0.26	0.08	0.02	0.00	11.17"

1994-2007 data: San Francisco air temperatures (°F) from the Western Regional Climate Center, <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7772>
2008 data from National Park Service Fort Baker Weather Station

Year	Jan	Feb	Mar	Apr	May	Jun	Seasonal Average
1994	53.66	52.68	58.1	57.58	58.71	61.03	56.96
1995	54.03	56.91	56.15	56.92	57.39	61.67	57.18
1996	54.02	57.09	58.74	61.4	61.71	62.83	59.30
1997	52.65	56.09	58.21	58.1	62.6	61.62	58.21
1998	53.63	52.66	55.66	55.43	56.55	59.3	55.54
1999	50.5	51.45	51.18	54.88	53.74	56.37	53.02
2000	52.63	53.83	54.94	57.1	58.24	59.5	56.04
2001	51.37	52.05	55.85	52.5	61.52	61.3	55.77
2002	50.68	55.45	53.85	54.83	55.02	58.02	54.64
2003	56.27	54.59	56.45	53.92	58.03	60.5	56.63
2004	51.77	53.69	60.24	58.48	58.13	58.93	56.87
2005	50.32	55.84	57.53	55.92	59.1	59.33	56.34
2006	52.61	54.7	50.89	54.87	57.35	60.2	55.10
2007	49.97	53.02	57.17	55.4	57.29	59.12	55.33
2008	48.6	50.63	52.26	52.5	55.83	57.65	52.92

E-mail confirming Miwok Trail Mission blue identification.

From: Susie Bennett
Sent: Sunday, April 20, 2008 4:53 PM
To: Bill_Merkle@nps.gov; Sue_Fritzke@nps.gov
Cc: Sharon Farrell
Subject: Extending the previously recorded range of the Mission blue butterfly north of Oakwood Valley

Hi Bill and Sue,

Based on Sharon's recommendation, I visited a grassy slope off the Miwok Trail just north of the Tennessee Valley Trailhead to identify a population of blue butterflies that reside there. I took photos and sent them to Dr. Jon Hafernik of San Francisco State University and Summer Lindzey (formerly of the GGNPC), and they both feel that this population of butterflies meet the general criteria of the Mission blue butterfly morphology. Also, I reviewed the 2003 paper Summer Lindzey and Dick Arnold wrote concerning the identity of the blues at Oakwood Valley and based on those findings (and Summer's statements below), I'm confident that this population of butterflies warrants the special protection given to Mission blues.

I photographed approximately 10 butterflies over a 2 week period (over 3 visits) to assess phenology, morphology, and host plant choice (all which play important roles in identifying the species of this butterfly). Unfortunately, I don't have time to make additional visits to this site to complete a more thorough examination of the population as a whole, but the token individuals I observed definitely suggest that these butterflies are a reproducing, productive population of Mission blues. I photographed many adults to assess the dot arrangement/structure on the ventral wings, female dorsal wing color, host plant choice, and a few male butterflies to quantify the width of the black borders on the dorsal wings of the butterflies. All these assessments point toward Mission blue. As Summer stated below, the halos around the black dots on the dorsal wings are less distinct than in some other Mission blue populations, but the other morphological clues, in conjunction with the *Lupinus albifrons* host plant species, simultaneous adult flight time, and proximity to known MBB populations validate this subspecies identification.

And lastly, I'd say this population is doing quite well. A very good proportion (~20%?) of smaller LUAL plants had significant amounts of Mission blue feeding damage, and I actually was lucky enough to witness a female depositing eggs in the area. This leads me to believe that this is a persistent population, likely a potential source for other lupine patches in the area. Significantly down the trail I found I small lupine patch (probably less than 20 ft²) bisected by a trail that supported at least one Mission blue butterfly observed on a very hot day last week. A very quick search of the area showed several LUAL plants covered in dust from the trail, with 2 showing signs of Mission blue larval feeding damage. I wouldn't expect this small (very exposed) patch to persist very long without having some degree of population influx from a nearby more supportive habitat. If I had more time I'd love to explore the area for more butterflies to get a better grasp of the spatial distribution.

I took some GPS points representing where I observed this butterfly population. I'd be happy to provide you with a map if you'd like to see where the population's located. Thanks for your time, and have a great week!

-Susie

From: Summer Lindzey [mailto:summeroutside@hotmail.com]
Sent: Monday, April 14, 2008 3:55 PM
To: Susie Bennett
Subject: RE: Possible mission blue butterfly north of Oakwood Valley?

Oh yeah, these are definitely Boisduval's Blue - as is mission blue -- B.B. is just the species' generic name. If it's not mission blue subspecies, it would have to be the pardalis subspecies, the one that overlaps to a degree with Mission blue the further north and south of traditional MBB sites. To closely match it, or to definitively call it MBB, it should share the same host plants and the same peak emergence. Sounds like both are true. As for using morphological characters, I see some ambiguity : the ventral (under) hind wing maculations spots are more pronounced than on the ventral forewing, which is typical of MBB, but they don't have a very distinct halo of white, which really typified MBB specimens from SF. What Dick Arnold and I did to certify OV MBB as MBB was to look at the **trend** among *many* individuals at OV to see to what degree the population conformed to four morphological characters. We outlined those in our report which Sue Gardner should have. The form the females take is especially important: if they're solid brown on the backside (dorsal), then it's definitely a version of pardalis not mission blue. Take some pics of females, and I could better gauge.

Keep in mind the morphology of mbb v. pardalis or any other species of icarioides is very labile, often determined by climate available host plants in the immediate area. Because of this there is a great degree of similarity between what we call mbb and what you see even in the mountains. Given that these butterflies are still in Marin Co, still on very similar ground (literally), share the same host plant, and fly at the same time, I would feel very comfortable extending them the name of Mission blue, with a healthy degree of caution.

Send me any more pics or questions. I'll be down next week as well for 2 days, so maybe we can talk more then?

Summer

Subject: Possible mission blue butterfly north of Oakwood Valley?
Date: Sun, 13 Apr 2008 16:02:34 -0700
From: SBennett@ParksConservancy.org
To: summeroutside@hotmail.com; hafernik@sfsu.edu
CC: SFarrell@ParksConservancy.org; CCrooker@ParksConservancy.org

Hi butterfly experts,

I hope you're both doing well! I've got a butterfly question that I hope one of you can help with, if you're up for the challenge. =)

Just north of Oakwood Valley along the Miwok Trail coming out of the Tennessee Valley Trailhead parking lot, Sharon Farrell thought she saw

a Mission blue 2 years ago. This year, she sent me out to confirm the sighting, and I think she might just be right! I found a group of blues, and they're definitely *Icaracia icariodes*, but I don't know if they're officially Mission blues. My understanding is the difference between the mission blue subspecies is as follows: mission blue females have blue on the upper wings, boisduval blues have a thicker black border inside the white border on their back wings, and mission blues have thicker white halos around the black dots on their underwings. I checked out the population on Saturday, and it was over 80 degrees. I saw about 5 individuals, and none of them appeared to be females. None of them stopped to bask in the sun since it was so hot, so basically they just bounced from plant to plant to nectar, which allowed me to take some good photos of their underwings but none of the blue sides. Would you take a look at the photos and see what you think? Thanks so much for any help you can provide!

-Susie Bennett